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REPORT OF THE ARMY MATERIEL ACQUISITION REVIEW COMMITTEE (AMARC). VOLUME I. PRECIS

Wendell B. Sell

Office of the Secretary of the Army
Washington, D. C.

1 April 1974

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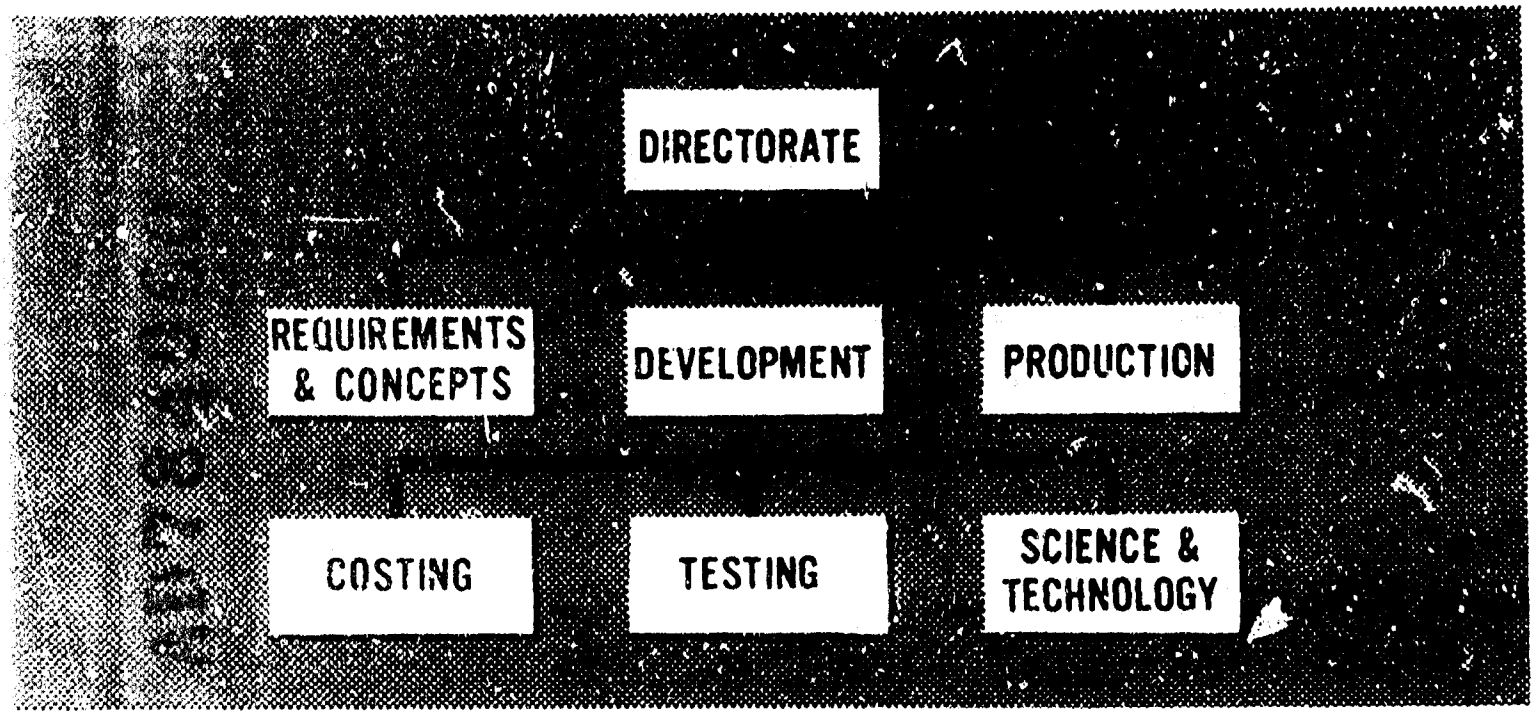
ARMY MATERIEL ACQUISITION REVIEW COMMITTEE
(AMARC)



VOLUME I
PRÉCIS

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DISCLAIMER

This report is the product of the Army Materiel Acquisition Review Committee (AMARC). The AMARC was an advisory committee from outside the Department of Defense. It was formed by the Secretary of the Army on an ad hoc basis to analyze the Army's materiel acquisition process and recommend improvements. Although some recommendations contained herein have been, or are being; implemented, the major ones currently are being reviewed by the Army Staff and major commands. Accordingly, this report remains advisory in nature. It reflects neither official policy nor approved plans of the Department of the Army.

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DEPARTMENT OF THE ARMY
WASHINGTON, D.C. 20310

DACS-XSA-ARC

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MEMORANDUM FOR THE SECRETARY OF THE ARMY

SUBJECT: Transmittal of Report of AMARC Study

1. Reference: Memorandum, Under Secretary of the Army for Dr. Wendell B. Sell, dated 6 December 1973, subject: Army Materiel Acquisition Review Committee (AMARC).

2. I am pleased to submit herewith the report of the Army Materiel Acquisition Review Committee (AMARC). As requested, AMARC has sought out problems, including any causative elements fundamental to the Army and its acquisition process, and has recommended solutions. AMARC has also attempted to present a balanced view, identifying strengths as well as weaknesses.

3. Certain recommendations are appropriately qualified in recognition of the brevity of the study, the newness of the current Army acquisition system, and the less than complete treatment of "real world" considerations.

4. Each Committee member wants to express his appreciation to the members of the Army for their cooperation, candidness and hospitality in responding to AMARC inquiry. We also want to thank you, the Steering Group and the Advisory Panel, for your counsel and for opening the necessary doors.

5. We hope the Army finds the recommendations of the study clear and of assistance in improving the acquisition process which is so vital to the Army's combat function. If I or any member of AMARC can assist further in clarification of any issues or answering any questions, please do not hesitate to ask.

Wendell B Sell

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Wendell B. Sell
Chairman, AMARC

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PRECIS

A. THE ASSIGNMENT.

1. The Secretary of the Army established the Army Materiel Acquisition Review Committee (AMARC) in December 1973, to operate under the guidance of a Steering Committee composed of the Under Secretary of the Army, the Vice Chief of Staff, and the Assistant Secretaries of the Army for Research and Development, and for Installations and Logistics. The effort was specified to include:

a. A comprehensive review, analysis and critique of the Army's materiel acquisition process,

b. Recommendations for improvement, with concentration on organization (especially AMC), and procedures.

2. Thus, in addition to searching out key problems and acquisition system fundamentals that may have led to the problems, solutions were also solicited. The AMARC group was challenged to search out strengths as well as weaknesses, and requested to suggest both expansions of the success modes and recommendations on the improvement of weaknesses.

B. AMARC COMPOSITION, CREDENTIALS, AND INITIAL BIAS.

1. AMARC is preponderantly a non-military, non-governmental group. Several members were drawn from industry with experience working with all three Services, NASA and AEC. Several also have ongoing high level corporate responsibility commensurate with that of top Army managers in attempting to be timely and congruent with DOD's acquisition guidelines. Many members of the group have attacked the acquisition problem overall, or in significant portions, for DOD in various committee assignments or for other groups such as the National Security Industrial Association. Most members of AMARC knew each other on a first name basis before undertaking this assignment.

2. Initial perceptions (pre-bias) of the AMARC appeared to include the following:

a. The Army has lagged the two sister services in updating its materiel acquisition process.

b. The Army has had its share of weapon development failures.

c. The Army has a long history of rejecting ideas not originated in its AMC laboratories and arsenals.

d. Within AMC there remain vestiges of the old technical service (e. g. Ordnance) approach to materiel development.

e. The Army weapon development cycle is too long.

f. The Army's dependence on, and use of contractor capabilities was considerably less, and considerably different, than that of, say, the Air Force.

g. Headquarters Department of the Army has never fully accommodated to its role change in 1958, when by law it became a provisioner--of men, materiel and doctrine. The custom of rewarding top combat commanders with top DA assignments involving considerable managerial and business type functions is anachronistic.

3. Such perceptions before the start of AMARC were, by no means, unanimous in the group, but they would be fairly described as a relative bias against the Army. How many of these initial ideas remained after the study can be discerned from the material that follows in the report.

C. AMARC ORGANIZATION. The Director organized the committee into six specialty area teams and a Directorate. Three teams spanned the life cycle of an item in the acquisition process--Requirements and Concepts, Development, and Production--and three teams represented salient support areas--Costing, Testing and Science and Technology.

D. SUMMARY, FINDINGS AND RECOMMENDATIONS; GENERAL. General findings and recommendations in this section are derived from team reports in Volume II.

1. General.

a. Historically, the Army has not done a good job in materiel acquisition. It is clear that the Army perceives the problem, is sincere in its desire to improve, and is striving to correct its shortcomings. There is solid evidence of recent improvement. The Army is and has been changing its organization and procedures. The acquisition process as outlined in AR 1000-1 and its implementing Letter of Instruction is basically sound. However, AMARC sees serious problems that need correction. AMARC also sees signs that any improvement program could suffer the same fate as many of the materiel programs that led to the call for AMARC and for many of the same reasons.

b. A long term commitment to an improvement program is essential to changing the materiel acquisition process. The relatively brief assignments of political appointees and high level military in key HQDA management positions results in strong commitment to short term ideas and actions, but a weak commitment to long term ideas and actions, and a weak institutional memory. This situation is aggravated further by an inevitably human overtone of the turnover pattern--an inherited situation/organization usually needs improvement. For either the Army's own proposals or AMARC recommended changes to take place the Army must:

(1) Make (and keep) a steadfast long term commitment to improve the materiel acquisition process.

(2) Design and implement a method for continuing self evaluation of the acquisition process, as differentiated from specific materiel programs in the process.

(3) Periodically review, update, and revitalize the improvement program.

2. People.

a. Organizational, procedural and policy changes are recommended by AMARC, but the obvious key to improving the acquisition process is through the people involved. Improvement is needed not so much in numbers as in professionalism, motivation, innovativeness, and pride. This is not news to the Army. However, it is not clear that in the long run the people needed will be educated and trained, or that they will be assigned to the important materiel positions, or that they will be properly recognized. The Army stresses the combat readiness of today's forces quite correctly. Priority is given to activities to improve and maintain readiness. Priority is given to training people to lead in combat and the best are selected as combat commanders. Missing is the requisite attitude throughout the Army and the needed flexibility in policies and procedures to fill the Army's materiel acquisition positions with similarly qualified, motivated people, military or civilian, who are proud of their jobs.

b. General Abrams understands the problem well on the military side since it is common to several non-combat career fields that are important to accomplishing the Army's mission. He has issued adequate guidance, but the intent of his actions will take time to permeate the Army.

(1) The recently instituted Army Officer Personnel Management System (OPMS), recently modified guidance to selection and promotion boards, and the recent decision to centrally manage Project Manager (PM) careers should help.

(2) Also needed, as a matter of priority, is a solid basis for verifying the potential viability of the field, including its attractiveness as one of the "many paths to the top." The Army must identify by individual position all of the possible assignments in the Program Manager career field. Also, top level General Officer positions for which good PMs or others in the field would be eligible (DA Staff and others) should be specifically identified. These data will provide total "people" requirements by grade, experience, and education. From these data one can determine training and education requirements and can judge the opportunity for advancement, and the general viability of the career field.

(3) On the civilian side there is a parallel and perhaps more important need to improve the quality of the work force. The existing career development programs for scientists and engineers needs a big boost and must be matched with programs for all the narrow discipline specialists in the many fields that comprise materiel acquisition, e.g. costing, testing, procurement, programming, etc.

(4) It is recommended that the progress resulting from these actions be checked regularly, preferably by outsiders, through interviews and assessments of individuals throughout the system.

3. Instability of Requirements.[1]

a. Instability of requirements after commitment to a major program is a major weakness in the Army's materiel acquisition process. Soft or changing requirements have led to prolonged development, cost overruns, systems rejected by the user, GAO and congressional blasts, etc. etc.

b. A firm "requirement" with its implicit, eventual commitment to a production decision should not be established until both the user and developer have an agreed understanding of what is achievable and usable. For systems that do not evolve from existing systems, this will normally take place only after a thorough advanced development program, to include testing of components and prototypes. Thus, when the requirement is established it will be well defined, accurately costed, and defensible. AMARC recommends that the requirement not be formalized until entry into full scale engineering development (6.4). Establishing the requirement earlier is to invite disaster by denying freedom of investigation, the pursuit of alternatives, and necessary development iterations including room for failure. There is also the danger of a premature, unwanted, strong psychological commitment.

c. Once top level managers have decided to enter full scale development, discipline is needed in the management system. The requirement must be kept relevant to technology, threat, doctrine, and affordability. However, between formal challenges at appropriate milestones, would-be opponents, whose case has been heard, and "artificial" managers on staffs, should not be allowed to subvert the constancy or schedule of the program. Also, action is required to reduce undesired changes introduced outside the system management structure through

[1] Requirements is used here in its broadest sense and involves: what is needed, in terms of physical and performance characteristics; how many, with a planned delivery schedule; and what it will cost, in all budget categories, over its life cycle.

lack of coordination of decisions between the Program Objective Memorandum (POM) and budget, on the one hand, and the system development and production plans, on the other. Top level management attention is indicated.

d. Management discipline, from top to bottom, is also essential to avoid overriding the developer's authority and freedom prior to a requirement decision. There is a constant danger, induced by the bureaucracy, that the structure needed for justifying and selling advanced development programs will become overstructured denying the flexibility needed.

4. Staff Layering. Staffs at HQ DA (and OSD) make policy and provide guidance to the decision makers at their respective levels. AMARC investigations have shown obvious areas where high level staff assistance is needed, yet lacking, and areas where staff members improperly intrude into the acquisition process. Also, with good intention of improving a program, staffs frequently consume the time of low level managers, thus blocking the goal of program improvement. Staffs should remove, not emplace, the "roadblocks" that stifle, delay, and add costs to development programs. AMARC finds need for:

a. Clear definition of the proper functions of each staff, especially at higher levels, and limiting staffs to these functions.

b. Elimination of "line item" management of projects above the developer's level until they reach engineering development (6.4).

c. A study to reduce the number of people involved in every staff level of review and the depth of their involvement. Planned reductions in HQDA (and OSD) are a step in the right direction, but AMARC believes the cuts can be deeper.

5. Weapon Simplicity and Evolutionary Development

a. The DOD approach to materiel acquisition evolved during an economy of abundance. In justifying their needs to a highly educated and performance-quality biased OSD, the services have tended to favor complex, sophisticated weapons. The systems have been analytically proven to be cost-effective and were often technically prestigious,

but they have been costly in dollars, training needs and logistics requirements.

b. The economy of abundance no longer exists in America. The Army's real-dollar-budget is smaller now than in any time since 1962 and a smaller percentage of the budget is available for the acquisition of new systems. The average ability of the volunteer force may be the same as during the draft, but there are fewer above average personnel. Personnel turbulence appears to be subsiding, but the training burden is still heavy since 25 percent of its soldiers are new to the Army each year.

c. In light of the foregoing it appears time for the Army to increasingly (but selectively) adopt the weapon system design philosophy attributed to Israel, France and the Soviet Union. This philosophy centers on evolutionary development and a steady transfer of "bite size" technological advances from earlier to later weapons. Quantum advances in technology are avoided, with occasional and deliberately chosen exceptions. Evolutionary improvements reduce the technology risks, simplify training, and improve logistics support. The Army has in its inventory two good examples of this approach--the M60A1 Tank and the COBRA Helicopter. It should also be acknowledged that a certain class of sophistication, i.e., that devoted to "hands free" operation is sometimes desired.

d. AMARC recommends:

(1) The Army institutionalize a bias toward weapon austerity and simplicity, enunciating a policy of evolutionary improvement of standard equipment as the preferred method for acquiring new systems.

(2) ASARC/DSARC reflect this bias and hammer at the issue.

(3) DOD should expand the current practice of permitting the services to retain control of self-generated system tradeoffs to help establish a bias toward simplicity. OSD must be prepared to deal with the Congress on this basis to preclude penalizing the services by reducing the budget slice.

E. SUMMARY FINDINGS AND RECOMMENDATIONS: REQUIREMENTS AND CONCEPTS.

FOCUS

- Timing of formal "requirement."
- Management and flexibility of early development programs.
- Relationship of user and developer.
- Receptivity to new ideas.
- Justification of requirements.

1. Scope. The Army weapon system acquisition process was examined with emphasis on the Conceptual Phase of development. The responsibilities and functions of the several commands and agencies involved in "requirements" generation and satisfaction were examined. Success (or the lack thereof) in fielding useful and operationally effective equipment was the criterion established to judge the adequacy of the Army's acquisition process. (See Team report, Chapter I, Volume II.)

2. Strengths.

a. Much stronger voice given TRADOC as user in deciding equipment needed.

b. Recent cancellation or delay of questionable programs.

c. Rigorous screening of new proposals (ROCs).

3. Weaknesses.

a. Too early lock-in on "requirement" followed by ambitious development program from outset.

b. "Not invented here" attitude blocking out new ideas.

c. Insufficient coupling of interests and energies of materiel developer and user.

4. Recommendations.

a. Be alert to danger that structured "requirements" process with attendant detail will create inflexible attitudes.

b. Delay ROC, Task Force, ASARC, DSARC and appointment of a Program Manager until critical experiments have been performed, technology is demonstrably in hand, and user test of concept with experimental equipment demonstrates all salient points.

c. Establish Army policy that preferred method for acquiring developmental systems is through evolutionary improvement of standard equipment.

d. Provide user increasing influence over expenditures by materiel developer of R&D funds as systems mature.

e. Designate CG, TRADOC "user representative" as general rule.

f. Confine OSD role to defining mission areas and overall funding levels, and adjudicating interservice disputes, while avoiding line item management of 6.2 and 6.3 funds. Provide DDRE and ASA(R&D) discretionary funds for use in initiating a few projects in service laboratories.

g. Improve COEA by comparing new system with that replaced to clearly identify Relative Effectiveness (RE), Relative Cost (RC), and

Relative Worth (RW); provide board of senior TRADOC officers for review of COEA prior to inclusion with other inputs to decision process.

h. Introduce large measure of competition with in-house laboratory way of doing business, in effort to make them more productive.

F. SUMMARY FINDINGS AND RECOMMENDATIONS: DEVELOPMENT.

FOCUS

- Definition of requirement and role of user.
- Layering of staffs.
- Timing of formal "requirement."
- AMC management of acquisition and readiness.
- Program Manager's experience and motivation.
- Civilian personnel management.

1. Scope. The Army weapon system acquisition process was examined from the Validation Phase through Full Scale Development, as well as aspects of project management. Departments of Defense and Army missions, organizations, functions, policies and procedures were included in the study to determine possible impacts on acquisition. Expressed concerns of Army weapon system management led to analysis of previous case studies and prior reports. Most of the concerns were not new. (See Team report, Chapter II, Volume II.)

2. Strengths.

a. Proposed Army staff reorganization reducing the number of staff agencies involved in acquisition and cutting manpower 14 percent.

b. AMC progress since 1967 in progressively reorganizing to reduce fragmentation layering, and manpower (cut by 31 percent).

c. AMC Commodity Commands competence in product improvements and solution of fielded weapons problems.

d. AVSCOM and MICOM management of systems acquisition and readiness.

e. TRADOC and AMC informal involvement of using units in early development cycle.

f. Task Force concept for preparing Development Concept Paper.

g. Army proposal to strengthen Project Management.

h. Ways found within Civil Service system, on an exception basis, to obtain qualified people quickly.

3. Weaknesses.

a. Poor definition of requirements, lack of clearly defined mission deficiencies, and confusion over identity of real user.

b. Indecision in DA Staff/OSD on individual weapon systems, too much layering of review and approval, and imbalanced structure in number of people who review at each level.

c. Rigid procedures for systems acquisition limiting flexibility in 6.1 through 6.3 program execution and requiring ROC and DCP too early in cycle.

d. Standard AMC commodity command organization and focus on readiness hampering flexibility and acquisition of new weapons systems.

e. Inadequate support of project management technique and project managers (PMs): giving insufficient authority to act within

approved thresholds, requiring too many non-decision briefings, eroding authority and progress with questions, denying recognition of PM importance to Army mission and causing PMs to feel not competitive for promotion.

f. Deleterious effect on performance and morale of frequent reorganizations and Reductions in Force (RIFs), and incompatible goals for average grade reduction.

g. Rigid Civil Service seniority system, job classification, and recruitment procedures which: eliminate young, qualified people in manpower reductions; impose delays in manning new offices; fill technical positions with personnel not fully qualified.

4. Recommendations.

a. Define requirements clearly and concisely for filling a defense mission deficiency.

b. Direct user representative to participate strongly in developer activities and acquisition decisions.

c. Reduce layers of decision making and need to traverse each layer for individual staff element concurrence.

d. Avoid locking into a materiel requirement or ROC until prototype hardware demonstrates required performance capabilities.

e. In AMC, evolve toward separating management of new weapon systems and major product improvements from logistics management, at levels determined by CG, AMC.

f. Grant proper recognition and credit to good project managers; eliminate "second-class" assignment perception.

g. Improve use of Civil Service personnel by extending REFLEX program to all RDT&E programs, make greater use of military, PL 313, consultants and contractors.

G. SUMMARY FINDINGS AND RECOMMENDATIONS: PRODUCTION.

FOCUS

- Acquisition strategy planning.
- Competition throughout acquisition cycle.
- Life cycle costing procurement.
- Life cycle support.
- Industrial preparedness planning.
- In-house production facilities.

1. Scope. The production aspects of the Army's materiel acquisition process were examined including actions taken during development phases that impact on production as well as other disciplines and constraints which affect production decisions, i.e., mobilization needs, arsenal production capabilities and logistical support alternatives. (See Team report, Chapter III, Volume II.)

2. Strengths.

a. Excellent basis for weapon system acquisition strategy established in DODD 5000.1 and AR 1000-1.

b. Increased AMC emphasis on Industrial Preparedness Planning (IPP) Program during ... st two years.

3. Weaknesses.

a. Lack of realistic and thorough planning for system acquisition.

b. Knowledgeable personnel skilled in disciplines of production and procurement not used early enough in acquisition cycle.

c. Too little attention given to development and maintenance of effective competitive environment for production of complete systems and major subsysteims/components.

d. Producibility not always considered in early development phases.

e. Excessive use of Military Specifications and Standards impeding design flexibility and adding unnecessarily to total cost.

f. Inadequate use of commercial warranties.

g. Guidance lacking for logistic assessment in planning acquisition program.

h. Insufficient high level emphasis on life cycle cost procurement.

i. Weak justification for retention of production facilities caused by failure to identify realistic force structures in Industrial Preparedness Planning.

j. Idle production capability in Army Arsenal system.

k. Other deficiencies in Design-to-Cost, "lead" acquisition commands, technical data packages, award fees, hard/rate tooling, resource allocation for approved programs, multi-year procurement, economic order quantities, old production facilities and contractor support of fielded systems.

4. Recommendations.

a. Initiate acquisition strategy planning early in cycle; planning group include personnel skilled in procurement and production.

b. Consider "second source" production in large programs lacking competition in development and initial production.

c. Charge project manager with responsibility for producibility evaluations.

d. Hold Military Specifications and Standards to minimum; requiring none prior to Engineering Development, except as approved by HQDA, and reviewing carefully any specified for subsequent engineering development contracts.

e. Experiment in use of commercial warranties.

f. Include logistic assessment in planning documents.

g. Increase DA and AMC emphasis on application of life cycle costing procurement.

h. Centralize industrial preparedness responsibility in one DA office.

i. Place idle production facilities in "stand-by" if workload not sufficient to make cost effective.

H. SUMMARY FINDINGS AND RECOMMENDATIONS: COSTING.

FOCUS

- Costing organization and procedures.
- Location of costing capability.
- Quality of data base.
- Incentives and accountability.
- Downward bias and "buy-in" syndromes.
- Life cycle costing and design to cost.

1. Scope. The weapons system cost estimating analysis and management process was examined for all phases of the life cycle with particular emphasis on acquisition. The process was investigated from the Project/Commodity Command level up through OSD. The major thrust of the study was to make detailed recommendations that would assist in countering the Army's problems with cost growth. (See Team report, Chapter IV, Volume II.)

2. Strengths.

a. Improving cost estimating data base and basic capability to prepare cost estimates.

b. Involvement of all echelons of materiel acquisition in costing, including project managers in baseline cost estimates, and cross fertilization between commodity command and project office.

c. Basing programming of funds on independent cost estimates, in selected areas.

d. Policy and procedural guidance promulgated in Life Cycle Costing.

e. Understanding of design-to-cost concepts and resultant improving control of costs.

3. Weaknesses.

a. Institutional downward bias in estimating costs.

b. Lack of understanding of responsibilities and accountability of organizations in generation of realistic cost estimates.

c. Location of costing in comptroller offices not conducive to improving costing professionalism.

d. Paucity of cost analyst incentives and career opportunities.

e. Short tenure of project managers rendering them not accountable for consequences of poor cost estimates.

f. Poor costing data base.

g. Frequent contractor "buy-ins" with consequent difficulties.

h. Unrealistic life cycle cost estimates resulting from weak techniques and procedures for gathering operating and maintenance costs.

i. Inaccurate design-to-cost goals and limited project manager trade-off margins and authority to meet goals.

4. Recommendations:

a. Publish policy guidelines on responsibilities of organizations for generation and flow of baseline and independent cost estimates, and preclude changes in independent parametric cost estimates (IPCE) at higher echelons.

b. Remove weapons system costing from comptrollers at all levels; and establish separate offices reporting to deputy commanding general at commodity command and AMC, and Vice Chief of Staff, at HQDA.

c. Strengthen cost data base on past and present systems; assign commodity commands responsibility for compiling and documenting data on physical and performance characteristics, costs, schedules, and milestones; and link schedule-estimating efforts to cost-estimating efforts.

d. Recognize costing personnel as valuable team members; include them on source selection evaluation boards and provide them opportunities for professional advancement.

e. Counter downward bias syndrome by indicating bandwidths of uncertainty and retaining detailed baseline cost estimates with project throughout acquisition; prepare independent cost estimates to augment baseline estimate with alternate estimating methodology.

f. Assure project manager's tenure permits holding him accountable for program cost estimates.

g. Counter overrun possibilities by: programming funds based on IPCE; motivating against "buy-ins" by giving credit in source selection for sound and substantiated cost estimating; penalizing unsubstantiated low costs. In addition, negotiate cost-type development contracts after, rather than before, selection.

h. Support life cycle cost concepts and rationale on all applicable major weapons system acquisitions. Assess OMA costs on a continuing basis in support of Mr. Clements' 25 January 1974, Directive "Visibility and Management of Support Costs."

i. Delegate to program managers authority and flexibility to make day-to-day schedule, performance, and cost trade-offs required to meet design-to-cost goals.

I. SUMMARY FINDINGS AND RECOMMENDATIONS: TESTING.

FOCUS

- Independent test evaluation.
- TECOM, CDEC, and MASSTER.
- Organization for DT and OT.
- Testing personnel qualifications.
- Discretionary testing programs.
- Testing facilities.

1. Scope. The Testing Team reviewed development and operational testing, and force development testing and experimentation capabilities. Test policy and organizational relationships up to OSD were assessed for comprehension at all levels. (See Team report, Chapter V, Volume II.)

2. Strengths.

a. Sound basis for weapons system acquisition and testing established in AR 1000-1 and DOD Directive 5000.3.

b. Increased emphasis on Force Development Testing and Experimentation (FDT&E).

c. Organic capabilities for materiel developer DT and combat developer OT.

d. Independence of OTEA from materiel developer DT and combat developer OT.

e. AMC progress over last decade in closing and consolidating unneeded test facilities while retaining adequate base for current test needs.

f. Reasonable numbers of test personnel assigned in light of workload and contract support available.

3. Weaknesses.

a. Ambiguous and unpublished regulations, and absence of single recognized manager of materiel acquisition, and resultant lack of uniform understanding of important details of the acquisition process in the field and at top management levels.

b. Inadequate data base to measure operational effectiveness.

c. Frequent overlap between OT and the service-use phase of DT.

d. Fragmentation of FDT&E in the structural dispersion of MASSTER under FORSCOM and CDEC under TRADOC.

e. Separation of DT I and II from OT I and II, to keep OT independent from developer and user.

f. Lack of stability and clearly defined technical and operational performance characteristics, contributing to non-uniform application of test design measures.

g. Inadequate TRADOC participation in DT/OT.

h. Absence of a formalized discretionary testing program.

i. Masking of individual knowledgeable test officials' evaluations of test results.

j. Adverse impacts of military personnel rotation, civilian deputies, and inadequate grade structures.

4. Recommendations.

a. Designate single DA staff element to monitor acquisition process(as differentiated from specific items).

b. Present independent DT and OT evaluations at IPR/ASARC meetings.

c. Emphasize difference between DT and OT, based primarily on technical orientation of DT and operational orientation of OT.

d. Retain DT tasks in AMC, and OT tasks in TRADOC and OTEA.

e. Emphasize independence of test design and evaluation, rather than separate testing, as key to independence of OT.

f. Enhance TRADOC FDT&E and OT capabilities by assigning it MASSTER from FORSCOM, the Test Boards from TECOM (AMC), and an additional analytical capability.

g. Assure independence of DT design and DT evaluation by assigning control of both functions to AMSAA, leaving TECOM as a testing service.

h. Review existing activities to reduce costs by consolidation, closures, or increased contractor support.

i. Enhance personnel capabilities by expanding career development opportunities, and increasing use and duration of current stabilization programs.

j. Institute discretionary testing programs (approximately 5 percent of budgets) to foster low cost, high payoff initiatives.

k. Modify current test report and evaluation procedures to include individual opinions of knowledgeable personnel in test reports/evaluations furnished decision makers.

l. Place OTEA directly subordinate to the OCSA.

m. Consider placing Dugway Proving Ground in standby status.

J. SUMMARY FINDINGS AND RECOMMENDATIONS: SCIENCE AND TECHNOLOGY.

FOCUS
• AMC RD&E organizations.
• Success and failure modes.
• Assignment of RD&E missions.
• Adequacy of technology base.
• Innovation in AMC laboratories.
• Effect of Civil Service regulations.

1. Scope. The operation and management of AMC RD&E organizations and in-house laboratories were examined by making field visits to all commodity commands and 20 of the 21 AMC laboratories. Additional discussions and briefings were also conducted in order to assess the merits and problems of the existing laboratory structure. The objective was to evaluate the application of in-house RD&E resources and to evolve constructive recommendations which would increase the productivity of these resources and provide for more efficient use of personnel and facilities in the materiel acquisition process. (See Team report, Chapter VI, Volume II.)

2. Strengths.

a. High-quality leadership and staff at many laboratories.

b. Effective management innovations at MICOM, HDL, AMMRC.

c. Selection of civilian personnel from "apprenticeship" programs.

d. Use of advisory panels to good advantage.

e. Exploitation of some foreign development.

f. Increasing use of early modeling and simulation.

g. Increasing savings through Manufacturing Methods and Technology (MM&T).

h. Increasing productivity from single program element funding (SPEF).

i. REFLEX tailoring of work force to mission.

j. Avoidance of duplication through lead laboratory concept.

3. Weaknesses.

a. Predominant influence of logistic readiness over materiel acquisition at most commodity commands.

b. Segments of some laboratories not effectively directed toward support of Army mission.

c. Fragmentation of some R&D single-mission areas across two or more commodity commands.

d. Degradation of laboratory effectiveness through lack of assignment of major mission area.

e. Need for improved climate for innovation.

f. Some ineffective laboratory interactions with user.

g. Too little use of other defense or government laboratories.

h. Personnel management constraints hampering laboratory potential and effectiveness.

i. R&D impeded by delays in multilayer management programming and funding decisions, by outmoded determination and findings (D&Fs) and small purchase dollar limits, and by restrictions on computer procurement.

j. Erosion of one-third of technology base funding in ten years.

k. Insufficient attention given to risk factors in R&D planning.

4. Recommendations.

a. Major Recommendation. By evolution, consolidate laboratories, installation and commodity command RD&E elements, project managers, support elements, selected user elements, and command elements into mission-oriented development centers; logistic and readiness functions performed in logistic centers. For implementation of development center concept, major events listed below are recommended for Army consideration. Some actions in this concept have been anticipated in AMC's current planning. With the time and resources available, AMARC has not been able to perform detailed analyses necessary to support final decision; however, based on visits to the laboratories and commodity commands, actions suggested have emerged as the most likely candidates for possible implementation.

(1) Create new Armaments Development Center at single location, through evolutionary process, by consolidating selected elements of Frankford, Picatinny, Rock Island, and Watervliet Arsenal RD&E activities together with Ballistics Research Laboratory and portions of ARMCOM RD&E Directorate. Incorporate Edgewood Arsenal missions without relocation. Retain minimum essential engineering functions at other arsenals to support required production activities.

(2) Establish Communications Development Center by consolidating Communications ADP Laboratory, Electronics Technology and Devices Laboratory, Electronics R&D Technical Support Activity, SATCOM RD&E elements, and portions of ECOM RD&E Directorate.

(3) Evolve to Combat Support Development Center in Washington/Ft. Belvoir area by assigning Harry Diamond Laboratories additional missions of combat surveillance and target acquisition, and consolidating with Night Vision Laboratory, Mobility Equipment Research and Development Center (MERDC), Natick Laboratories (without relocation), possibly Human Engineering Laboratory (HEL), and minimum elements from TROSCOM RD&E Directorate. Appoint project manager for Tri-Service Food RDT&E Program located at Natick to report directly to AMC.

(4) Evolve to Air Mobility Development Center at Moffett Field, California, as long-term goal by consolidating AVSCOM RD&E Directorate, Air Mobility R&D Laboratory, and an engineering and systems integration facility. Early actions to support this evolution would be: (a) consolidation of Eustis Directorate mission with other portions of Air Mobility R&D Laboratory now collocated under cooperative agreements with NASA, (b) transfer of airdrop equipment R&D mission from Natick to AVSCOM, and (c) transfer of Avionics R&D mission from ECOM to AVSCOM.

(5) Create Ground Mobility Development Center by modifying mission of existing TACOM Laboratory to establish: (a) a government-staffed engineering and test facility; and (b) a contract-operated R&D facility.

(6) Transfer Electronic Warfare (EW) Laboratory and mission to Army Security Agency, except that AMC should retain electronic counter-counter-measures (ECCM) and vulnerability activities for missiles, communications, and non-communication systems.

b. Additional Recommendations.

(1) Assign combat officers with appropriate experience to act as consultants on user aspects of the program at development centers.

(2) Make more use of other government laboratories.

(3) Strengthen technology base and extend single program element funding to all 6.1 and 6.2 programs.

(4) Evaluate development centers regularly.

(5) Reduce decision layering as much as possible.

(6) Foster climate for innovation.

(7) Try harder to overcome Civil Service constraints.

(8) Delegate to AMC authority for laboratory computer procurement up to $200,000 annual lease and $500,000 purchase.

(9) Identify clearly and track program risks.

(10) Raise D&F and small purchase dollar thresholds to $250,000 and $10,000, respectively.

(11) When Civil Service rules hamper productivity, consider contractor operation (GOCO).

K. SUMMARY FINDINGS AND RECOMMENDATIONS: DIRECTORATE.

FOCUS

- Progress in "new" acquisition process.
- Role of top managers in HQDA and OSD.
- Enhancement of professionalism in materiel acquisition disciplines.
- Task Force in development process.
- Rigor in requirements generation and updating.
- Management of laboratories early and small developments.
- AMARC follow-on.

1. Scope. The Army weapon system acquisition process was examined in terms of its management and personnel aspects after an early search for real progress in a process that--in its formalism--is relatively new to the Army. In an attempt to understand and detect the several effects of the Army vocational culture, the Directorate investigated certain management, procedural or process elements of the Army approach to materiel development and procurement not studied by AMARC specialty teams. (See Director's Report, Chapter VII, Volume II.)

2. Strengths.

a. AMC skills directed towards Technical Data Package and readiness function.

b. Recent Army intellectual attention to materiel acquisition, including objectivity vis-a-vis past failures.

c. DA cognizance of difficulties in establishing requirements.

d. Task Force process as method for reaching decision.

e. The people-economics of Army matrix system.

3. Weaknesses.

a. Redundancy and micromanagement of Army R&D.

b. Historic weakness in determining operational effectiveness, costs, and resultant requirements.

c. Insufficient emphasis on professionalism in materiel acquisition specialty disciplines.

d. Small development administrative management versus contractors.

4. Recommendations.

a. Promulgate R&D authority and responsibility document.

b. Lean towards simple, austere weapons.

c. Enhance professionalism in acquisition disciplines.

d. Extend use of Task Force as foundation for acquisition strategy, production, user response, etc.

e. Support TRADOC rigorous requirements leadership.

f. Improve engineering/technical response to contractors on small procurements.

g. After AMARC, create Materiel Acquisition Board chaired by DAS; members from ASA (I&L), ASA (R&D), AMC, TRADOC, DCSR DA, and DCSOPS. Hopefully let Army process mature.

APPENDIX A

LETTER OF INSTRUCTIONS TO AMARC DIRECTOR

APPENDIX A

DEPARTMENT OF THE ARMY
WASHINGTON, D.C. 20310

6 December 1973

MEMORANDUM FOR: DR. WENDELL B. SELL

SUBJECT: Army Materiel Acquisition Review Committee (AMARC)

Effective immediately, you are requested to assume the direction and leadership of the Army Materiel Acquisition Review Committee (AMARC) study requested by the Secretary of the Army. As such, you will have the responsibility and authority to conduct an independent review of the Army's total materiel acquisition process.

The enclosed instructions outline in general terms the scope, organization and objectives of this effort to the degree we have developed and agreed upon them to date. Per our prior discussion, you should feel free to suggest modifications to the steering group when and as they appear desirable to the task force. It is hoped that the results of this effort can be available in oral and written form for review by senior Army and other DOD management personnel by no later than 1 April 1974.

The importance and need for a hardhitting and objective review, analysis and critique of our existing materiel acquisition process cannot be overemphasized. It is earnestly desired that the study "tell it like it is" by summarizing and highlighting our strengths as well as our weaknesses together with relatively detailed recommendations as to how the latter can be materially improved in the near future.

Fred C. Weyand
General, United States Army
Vice Chief of Staff

Herman R. Staudt
Under Secretary of the Army

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INSTRUCTIONS
TO THE
ARMY MATERIEL ACQUISITION REVIEW COMMITTEE (AMARC)

PURPOSE: To assess the current Army organization and procedures for Materiel Acquisition and make recommendations for improvement. The goal is an organization and procedure which:

1. Is responsive to the needs of the Army in the field, assuring that effective equipment is introduced into the inventory in an efficient and timely manner,

2. Requires fewer personnel and less Army owned/or operated facilities,

3. Is a proper balance in the distribution of field and headquarters personnel,

4. Is a proper balance between in-house and contract operations,

5. Will result in the development, fabrication and user verification of hardware items more closely meeting established requirements prior to the heavy production involvement which has characterized our recent past history.

ORGANIZATION: (Chart 1)

The study will be conducted under the general supervision and guidance of a Steering Group composed of:

Under Secretary of the Army - Chairman

Vice Chief of Staff of the Army - Vice Chairman

Assistant Secretary of the Army (R&D) - Member

Assistant Secretary of the Army (I&L) - Member

The Steering Group will obtain advice from the Advisory Panel composed of:

Assistant Secretary of the Army (FM)

CG, Army Materiel Command

CG, Training and Doctrine Command

Assistant Chief of Staff for Force Development

Deputy Chief of Staff for Logistics

Assistant Vice Chief of Staff

Chief of Research and Development

The effort will be directed by:

Director - Dr. Wendell B. Sell

Deputy Director - Major General Frank A. Camm

and organized into teams as follows:

Requirements and Concepts Team

Development Team

Production Team

Costing Team

Testing Team

Science and Technology Team

Each team will be composed of a civilian chairman and two or three civilian associate chairmen who will serve on a part-time basis. Each team will have a full time staff, consisting of an Army officer (Executive Officer) and two consultants, to provide administrative support, factual data and analyses as required. The staff

consultants will be composed of at least four industry oriented personnel provided by the Army and at least six personnel from outside the Army provided by contract. The Army staff will provide administrative and clerical personnel.

CONDUCT OF THE STUDY.

a. Study Approach

(1) Ascertain the present status of organization and procedures, including the impact of 1972-1973 changes on the materiel acquisition process.

(2) Review findings and recommendations of previous studies of the Materiel Acquisition Process (list to be provided).

(3) Develop case studies of at least six development programs.

(4) Visit key installations and activities. (list to be provided)

(5) Study related activities of NASA, AEC, Navy, Air Force, large Industrial Corporations, and foreign governments including the Soviet Union.

(6) Conduct face-to-face interviews with key personnel in the Army and other organizations, to include DOD, GAO, Congressional Committee Staff, etc. (suggested list to be provided)

(7) Review input-output analyses of each AMC Laboratory (5 year period).

(8) Schedule periodic discussions with the Steering Group and Advisory Panel on status of study and findings.

(9) Study the six specific areas, noted above, and prepare specific recommendations for each area.

(10) Prepare a brief final report integrating findings and recommendations of all teams.

b. Schedule

Approximately 100 days, as shown on Chart 2.

c. Examples of topics to be considered include, but should not be limited to:

o Where can personnel reductions best be made (say a 20% overall cut)?

o Should the Army have separate commands for Materiel Development, Procurement Supply and Maintenance, and Testing?

o How should requirements be formally established, how rigid should performance specifications be, and how can "gold plating" be eliminated?

o How does the Army establish and maintain a strong independent cost estimating capability? How many echelons of review should there be?

o Which AMC laboratories can be closed or consolidated with others?

o How much of AMC laboratory maintenance and operations can be GOCO? How can such a transformation be implemented?

o How much freedom should laboratories have in planning and executing the Science and Technology Base?

o What criteria should apply in selection of Program Managers? Should they be the same for Military and Civilian Program Managers? What revisions in personnel policies are appropriate for Program Managers?

o How much stability should there be in personnel assignments, military and civilian?

o Are test boards needed? If so, how many and what should their functions be?

o What should be the reporting chain for the various test activities?

o How much of proving ground, range, and similar test activity operations can be by contract?

o Can we close some of our test facilities? If so, which?

o Which arsenals can be closed or consolidated with others?

o Can any or all of the arsenals be GOCO? If so, how should this be implemented?

o Is an R&D Staff needed at Commodity Command (or intermediate) headquarters? If so, what should the size be, and what should it do?

o To what degree does the user influence the process? How should this be modified?

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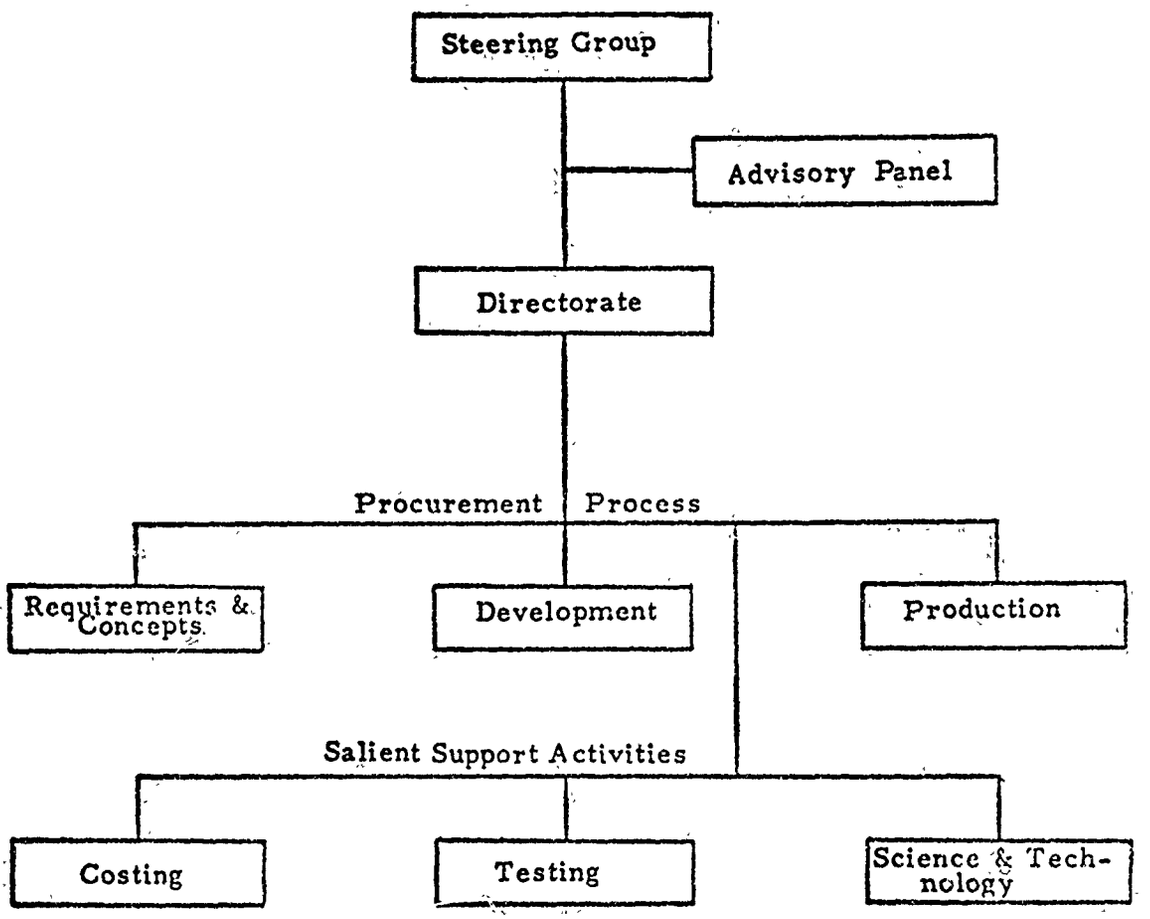
ARMY MATERIEL ACQUISITION REVIEW COMMITTEE (AMARC)

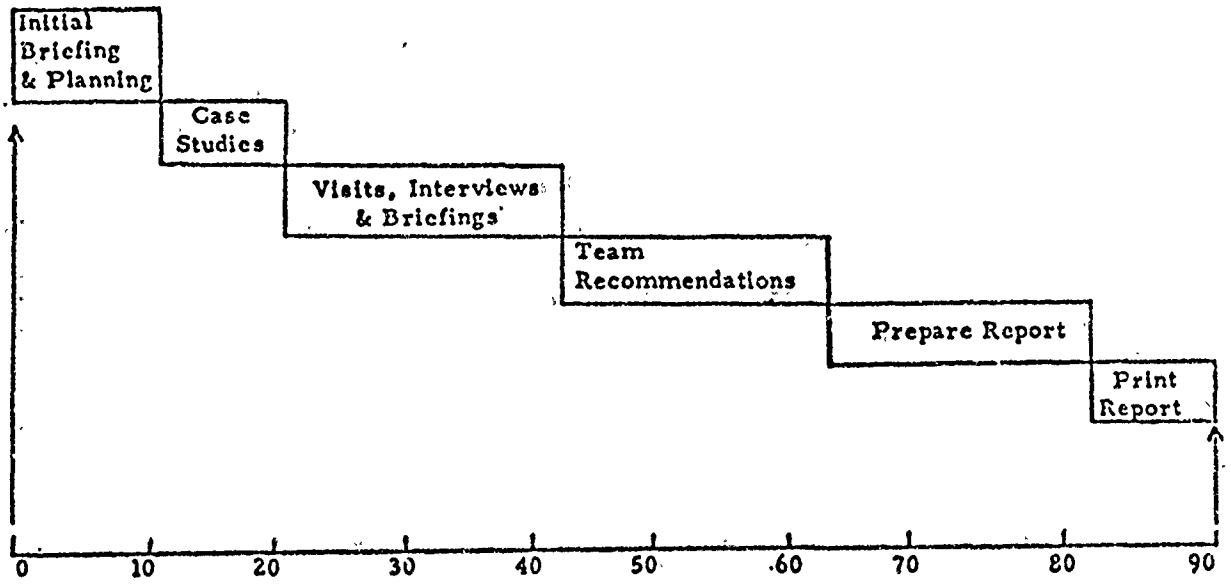


Inclosure 1

Chart 1

Army Materiel Acquisition Review Committee

100 DAY STUDY



Add 10 Days For Briefing Findings

Chart 2.

APPENDIX B
MEMBERSHIP

Members of Army Materiel Acquisition Review Committee

Director's Office

Dr. Wendell B. Sell - President and Chief Executive Officer, Hoffman Electronics Corporation; 1965-69, President and Chief Executive Officer of Packard Bell Electronics; Major General, USAF Reserve.

Major General Frank A. Camm - Assigned to Office, Chief of Staff, Army; 1972-73, Assistant General Manager (Military Applications) Atomic Energy Commission; 30 years service in U.S. Army.

Dr. William M. Duke - Chairman of the Board, Tasker Industries, Dynasciences Corporation, Will Duke and Associates, Interconnect Resources Inc., Systemation Inc., and Modulearn Inc., Los Angeles, California; 1964-70, President, Whittaker Corporation, Los Angeles.

Requirements & Concepts Team

Dr. Thomas S. Amlie - Acting Chief, Advanced Concepts Staff, Office of Systems Engineering Management of Federal Aviation Agency; 1952-70, Naval Weapons Center.

Dr. William H. Pickering - Director, Jet Propulsion Laboratory; 1936-51, Instructor and Professor, California Institute of Technology.

Mr. Haskell G. Wilson - Recently retired as Technical Director, Naval Weapons Center, after 23 years service there.

Development Team

Mr. Oliver C. Boileau, Jr. - President, Boeing Aerospace Company; 1968-71, General Manager of Boeing Missile Division responsible for Minuteman and SRAM missiles; 1971 to present, Member of Defense Science Board (DOD).

Mr. Daniel J. Fink - Vice President and General Manager, Space Division, General Electric Company; 1963-67, Office of Director of Defense Research and Engineering; Member of Army Scientific Advisory Panel.

Mr. David Shore - Division Vice President, Plans and Systems Development, RCA Corporation; 1954-70, Many jobs in R&D with RCA Corporation in aeronautics, radar, missile, communications, and other areas; U.S. Air Force, 1941-54.

Production Team

Mr. Frank Sanders - President, Logistics Management Institute, Washington, D. C.; 1972-73, Under Secretary of the Navy; 1971-72 Assistant Secretary of Navy (FM); 1969-71 Assistant Secretary of Navy (I&L); 19 years service on Committee on Appropriations, US House of Representatives.

Alfred L. Esposito, BG (Ret) - Manager, Fairchild Burns Company, Fairchild Industries, Winston Salem, N.C.; 1943-73, US Air Force, many assignments in R&D, to include Program Director of F-111 Program.

Dr. Joseph F. Shea - Senior Vice President and General Manager, Equipment Division, Raytheon Co.; 1962-67, Deputy Director, Office of Manned Space Flights and Manager of Apollo Spacecraft Program, NASA; Member, Defense Science Board (DOD).

Costing Team

Dr. Richard D. DeLauer - Executive Vice President of TRW Inc.; 1958-70 assignments in TRW: Director of ICBM Development, General Manager of Systems Engineering and Integration Division; Member of Defense Science Board (DOD); Active Duty, US Navy, 1943-58.

Mr. Richard C. McCurdy - Consultant, NASA; 1970-73, Associate Administrator, NASA; 1965-69, President and Chief Executive, Shell Oil Company.

Dr. John P. White - Vice President, The RAND Corporation; 1968-71, Director, Manpower Research Program, The RAND Corporation; 1964-68, Professor Lemoyne College.

Testing Team

Mr. Roy P. Jackson - Corporate Vice President, Program Management, Northrop Corporation; 1970-73, Associate Administrator, Aeronautics and Space Technology, NASA; 1962-70, Division Vice President and Assistant General Manager, Northrop Corporation.

Mr. Victor G. Raviolo - Director, Raviolo Associates, Grosse Point, Michigan; 1966-68, Group Vice President, American Motors Corporation; 1945-66, Ford Motor Company.

Dr. Eugene D. Reed - Executive Director, Ocean Systems Division, Bell Telephone Laboratories; 1947-71, Member of Technical Staff, Bell Laboratories.

Science & Technology Team

Mr. Earl J. Morgan - Executive Assistant to Vice President, Eastern Region, McDonnell Douglas Corporation; 17 years service on Committee on Government Operations and Armed Services Committee of U.S. House of Representatives.

Dr. Gerald P. Dinneen - Director and Professor of Engineering, Lincoln Laboratory, MIT; Vice Chairman, USAF Scientific Advisory Board.

Dr. Gus D. Dorough, Jr. - Associate Director of Lawrence Livermore Laboratory; 1971-73, Deputy Director for Research and Advanced Technology in the Office of the Director of Defense Research and Engineering.

Mr. Lawrence H. O'Neill - President, Riverside Research Institute, N.Y., N.Y.; 1957-70, Professor of Electrical Engineering, Columbia University; Chairman of US Army Scientific Advisory Panel; Member of Defense Science Board (DOD).

Support Staff of Army Materiel Acquisition Review Committee

Director's Office

Brigadier General Bennett L. Lewis - Chief, Requirements and Development Division, J-5, Organization of Joint Chiefs of Staff; 1969-72, Commander, Mobility Equipment Research and Development Center and Director RD&E, Mobility Equipment Command; 25 years service in US Army.

Colonel Louis C. Wagner, Jr. - Deputy Director, Materiel Programs Directorate, Office, Chief of Staff, Army; 1971-72, Advisor to Vietnamese Infantry and Armor Units, Military Assistance Command, Vietnam; 19 years service in US Army.

Requirements and Concepts Team

Colonel John F. Brewer, Jr. - Division Chief, Systems Management Division, Doctrine and Organization Directorate, Office of the Assistant Chief of Staff for Force Development, DA; 1970-71, Advisor to Deputy Director General of Highways, Ministry of Public Works, Military Assistance Command, Vietnam; 21 years service in US Army.

Mr. William H. Connerat - Senior Research Analyst, Operations Analysis Division, General Research Corporation; 1963-72, Senior Research Analyst, Logistics and Resources Analysis Divisions, Research Analysis Corporation.

Mr. Francis W. Shepherd - Point of contact with Logistics Management Institute (LMI); Presently Senior Project Director, LMI; 1963-66, Planning Staff Engineer, Honeywell, Inc.

Development Team

Colonel Robert L. Moore - District Engineer, Buffalo District, Corps of Engineers; 1969-72, Director, Plans and Analysis, US Army Materiel Command; 21 years service in US Army.

Mr. Charles B. Einstein - GS-14; Management Analyst, Army Materiel Command; 1965-70, Program Analyst, US Army Materiel Command; 1963-65, Review and Analysis Officer, US Army Materiel Command; 20 years with Civil Service.

Mr. Warren C. Heintzelman - GS-15; Chief, Installations Logistics Support Division, US Army Materiel Command; 1969-72, US Army Materiel Command, Europe; 1965-69, served as a deputy project manager; 24 years with Civil Service.

Mr. Theodore V. Liss - Point of contact with the Logistics Management Institute (LMI); Senior Project Director, LMI; 1966-68, Senior Research Associate, LMI; 1968-69, Executive Vice President, Eyler Associates.

Production Team

Lieutenant Colonel Fred E. Elam - Special Projects Directorate, Office, Chief of Staff, Army; 1970-72, Director, Depot and Transportation Management Department, U.S. Army Logistics Management Center; 14 years service in US Army.

Mr. William L. Clemons, GS-15; Acting Deputy Director, Requirements and Procurement Directorate, Headquarters, U.S. Army Materiel Command (AMC); April-August 73, Acting Chief, Procurement Policy Division, Headquarters, AMC; 32 years of combined Military and Civil Service.

Mr. Robert L. Stohlman, GS-15; Special Assistant for Major Weapon System Acquisition, Office, Deputy Assistant Secretary of the Army (Installations and Logistics); 16 years with Civil Service.

Costing Team

Lieutenant Colonel William J. Fiorentino - Staff Officer, Office, Chief of Research and Development, Army; 1969-71, Instructor, Defense Weapons Systems Management Center; 1966-68, R&D Coordinator, ARPA; Member, US Army R&D Career Field; 17 years service in US Army.

Mr. Joseph W. Noah - President, J. Watson Noah Associates, Inc.; resource analyst since 1958; Active Duty, US Air Force 1951-58.

Mr. C. David Weimer - Point of contact with Institute for Defense Analyses; 1960-69, Program Manager Space Propulsion, United Aircraft Corp.; Member of Defense Science Board Panel on Avionics and ODDR&E Electronics-X Study Team.

Testing Team

Colonel Theodore C. Williams, Jr. - Chief, Operational Test and Evaluation Agency Coordinating Office, Office of the Assistant Chief of Staff for Force Development, Army; 1973-74, US Army Operational Test and Evaluation Agency; 26 years service in US Army.

Mr. F. Donald Genova - Senior Analyst, General Research Corporation; 1960-65, Test Engineer, AVCO Corporation Test and Evaluation Directorate; 1958-60, Raytheon Company; 1956, General Motors Corporation.

Dr. Eugene W. Lewis - Staff Scientist, System Planning Corporation; 1969-72, Institute for Defense Analyses; 1956-69, many jobs in RDT&E at North American Rockwell Corporation and the Bendix Corporation.

Mr. Edward V. Somody - GS-15; Technical Director for Test Operations, US Army Test and Evaluation Command (TECOM); 1962-73, many jobs in field of testing with TECOM as engineer, project officer, test practices and standards, and R&D; 15 years with Civil Service.

Science and Technology Team

Colonel Alan A. Nord - AMC Project Manager for SAFEGUARD Munitions; 1970-72, Chief of Nuclear Plans, Central Army Group, NATO; 23 years service in the US Army.

Mr. Manfred Gale - Scientific Advisor, Department of the Army; 1968-70, Associate Technical Director, Mobility Engineering Research and Development Center (MERDC); 1966-68, Director, Intrusion Detection and Sensor Laboratory, MERDC.

Dr. Joel Bengston - Point of contact with Institute for Defense Analyses (IDA); 1962-Present, Assistant to President for JASON, Research Staff Member of Science and Technology Division and Research and Engineering Support Division, IDA.